PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Dough Kneading Machine.

I, MAX THIELE, of Kasernenstrasse 50, Zittau, Saxony, Germany, a German citizen, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a dough kneading machine, in which individual portions of dough (generally of such size as to be sufficient for the manufacture of small loaves, rolls and the like) are kneaded in basin-like cavities in two working directions lying at right angles with respect to each other.

I am aware of the fact that there exist devices for the manufacture of small loaves, rolls and the like, in which the suitably large or small portions of the dough are kneaded separately, but in these known devices the extent of the kneading movement is either uniformly large, or where there are differences therein, these consist merely in effecting the kneading in two stages, viz. a short kneading phase and a long one, the short phase concerning chiefly the filling of the mould, and the long one the kneading and moulding operation proper.

The machine designed according to the present invention is characterised by the fundamentally new feature that the individual portions of the dough are received in conical cavities of a rotary drum, around which they are distributed, and that a kneading member preferably provided with a rough working surface is arranged opposite the circumferential surface of said drum upon a supporting member combined with driving means of such a kind that said kneading member is reciprocated in the direction of the axis of the said drum and is rocked on this axis. Furthermore the kneading movement, or at least an essential part of the same, is preferably controlled automatically according to the size of the portions of the dough and the condition of this latter, in such a manner, that the highest efficiency is attained. In this way it is rendered possible to obtain ready moulded small loaves, rolls, or the like, which are always of the same density, and for this purpose I make use of an especially designed connecting member inserted between the kneading member and the driving means for the same. This member can be adjusted manually as well as automatically, in such a manner, that the kneading movement becomes larger when the resistance decreases, or the loaves etc. become smaller, and vice versa. In other words, the pressure with which the kneading member acts upon the individual portions of the dough to be turned into loaves etc. is regulated automatically according to the decreasing or increasing resistance which the dough presents, or the decreasing or increasing size of the loaves etc., and there is, thus, effected in a mechanical way what, otherwise, the baker effects with his palms.

The intermediate or connecting member mentioned may be a spring, or several springs which exerts or which exert a more or less strong pressure upon a system of levers forming, preferably, a part of a crank-drive which is driven, in turn by some device (gearing electric motor or the like) by which the machine itself is operated. A double-armed lever supported on a crank-disk may be used, one arm of this lever may be adjustable with respect to a stationary point of said disk and may be coupled with this member effecting the kneading operation, whereas the other arm of said lever is acted on by the spring or springs, the said spring or springs controlling the adjustment of the first-mentioned arm relatively to the crank-shaft automatically in such a manner that the pressure exerted upon the dough increases the more, the smaller the crank-circle becomes, and vice versa. The lever-system mentioned can be replaced by a multiple spring system so designed that the crank-disk is acted on solely by a plurality of springs connected at their other ends indirectly with the kneading member and taking this member along with them elastically.

The adjustment of the one lever-arm with respect to a stationary point on the crank-disc serves for rendering possible a preliminary adjustment corresponding to the different condition of the various

[Price 1/-]

sorts of dough; regulating the stroke is effected, however, automatically according to this invention.

Feeding of the individual portions of dough, while the machine is running and the moulding proceeds, is effected by placing said portions into basin-like cavities provided in the circumferential wall of a rotatable drum. The kneading member is arranged opposite this drum and the roughened working face of said member is curved correspondingly to the curvature of the drum. Said working face can be moved against and upon the successive dough portions and works each thereof in the manner stated. The diameter of the basin-like dough-receiving cavities of the drum mentioned decreases towards the centre of the same, and owing hereto, as well as to the action of a device permitting turning of the drum only in one direction, the kneading operation entails the partial rotations of the drum so as to bring another cavity opposite the kneading member. A presupposition is that there is always a filled cavity located opposite the kneading member, and another presupposition is, therefore that an additional part rotation is effected when the machine is started. Anyhow, this additional part rotation can be obviated by making the feed movements independent of the degree of filling of the cavities of the drum by employing the crank-shaft as means for causing the feed movements of the drum.

Keeping the drum cavities closed until they arrive opposite the kneading plate, and closing them again after the moulding has been effected and until their contents is discharged, may be effected by means of an endless band, but it is also possible to design the kneading plate in such a manner that it is able to close said cavities after filling them, whereas an endless band is used afterwards, viz. after the moulding of the loaves or rolls etc. has taken place, or is dispensed with altogether.

The invention is illustrated diagrammatically and by way of two examples on the accompanying drawing, on which

Figure 1 is a side-view of one embodiment of the machine.

Figure 2 a vertical section through the same along its axis.

Figure 3 a plan of a detail drawn to a larger scale.

Figure 4 a view similar to Fig. 1, showing a modification.

Figure 5 an axial section through the drum with its moulding cavities, as in Fig. 2, and

Figure 6 details of some of the driving members, drawn to an enlarged scale.

On the drawing, 1 (Fig. 1) denotes a foundation plate, carrying a broad standard 2 (Fig. 2) supporting a rocking shaft 3 extending forth from and fixed in said standard and carrying on its long projecting portion a rotatable drum 4 provided in its circumferential surface with a plurality of basin-shaped moulding cavities 11. To the ends of the shaft 3 are affixed two inverted V-shaped members 5, the ends of which are connected with each other by two rods 7 parallel to the shaft 3 and forming guide members for a slide 8 adapted to be shifted upon them and carrying a kneading plate 10 roughened upon its operating face, for instance in the manner of a grater or the like.

The standard 2 also resembles somewhat an inverted V the space beneath which accommodates the rods 7 and the slide 8, and into this space extends a vertical rotatable shaft 12 guided by a vertical sleeve 13 affixed to the bottom side of the plate 1. To the upper end of the shaft 12 is secured a disk 14 which is shown in plan, and drawn, to large scale, in Fig. 3. This disk is rotated by the shaft 12 in the direction indicated by the arrow (Fig. 3); it supports a bell-crank lever 16/16a which can oscillate on a pivot 15. The arm 16 of this lever is subjected to the pull of a tensile spring 17, the other end of which is affixed to the disk, and the arm 16 is formed at its free end with an eye 18 receiving a pin 19 (Fig. 2) extending downwardly from a horizontal member 20 guided in lugs 21 provided on the lower surface of the slide 8. The pin 19 and the member 20 form together a T. Instead of this T a ball-joint may be used as connecting means between the members 8 and 19 or 8 and 14.

When the disk 14 is rotated by the shaft 12, the pin 19 is moved in such a manner that there results a reciprocating movement of the slide 8 with the kneading plate 10 upon the rods 7, and a rocking movement of the inverted V-members 5 round the rocking shaft 3, as indicated by the arrow 9 in Fig. 2 and the arrow 6 in Fig. 1. The pin 19 remains always in its vertical position, in that it is connected movably with the slide 8 by means of the member 20. The slide 8, and the plate 10 however are rocked together with the rods 7. The rocking movement of the slide 8 and the plate 10 takes place, of course, in a circular path, the centre of which lies in the axis of the rocking shaft 3. The extent of the reciprocating movement of the slide 8 and the plate 10 upon the rods 7 depends upon the distance between the pin 19 and the axis of the

shaft 12, and this distance is variable, in that it depends upon the consistency of the dough, that is to say, upon the resistance which the dough presents, this resistance becoming active at the slide 8 and being transmitted by the parts 20, 19, 18, 16ª, and 16 to the spring 17 which is, thus, expanded more or less and counteracts with a corresponding strength.

The drum 4 must be rotated solely in the direction of the arrow 29 (Fig. 1), and for this purpose it is rigidly connected with a disk 25 engaged by a brake-band 26. One end of this band is attached to the standard 2 at the point 27, its other end to a helical tension spring 28 fastened to 27 and preventing any rotation of the drum on the shaft 3 other than in the direction of the arrow 29, the drum 4 being locked in the other direction.

A portion of the circumferential surface of the drum 4 is in contact with an endless band 22 guided by and over rolls 23 and 24 in such a manner that it closes those cavities of the drum which are filled with portions of dough not yet treated by the kneading plate and with portions of dough already treated by the same; the endless band 22 acts also as a conveying band for the last-mentioned portions when they have left the respective cavities 11 of the drum. The roll 24 is carried by the slide 8, and moved along together with it, in consequence whereof also the band 22 is moved (laterally) together with the said slide.

The manner of operation of the machine shown in Figs. 1—3 is as follows:

A suitable amount of dough is introduced into every cavity 11 (of the drum 4) that has arrived in its uppermost position, and instantly thereafter the drum is turned step by step in the direction of the arrow 29 until the filled cavity arrives above the kneading member 10. Now the shaft 12 is turned whereby the slide 8 is actuated. If the amount of dough is only small relatively to the cavity space, the kneading plate 10 can describe a larger circle than if the amount of dough is comparatively large. In this latter case the spring 17 is (owing to the eye 18 of the bell-crank lever 16/16ª lying now nearer to the axis of the shaft 12) subjected to a correspondingly stronger tension and the amount of dough in the respective cavity 11 is, therefore, more strongly pressed against the cavity wall, whereby that larger amount of dough is rendered more dense, as required, but corresponding to the increasing density the pressure becomes lower. The tension of the spring (which depends upon the amount of the dough in the cavities, or upon the resistance these amounts present), controls, therefore, the extent of movement of the kneading member 10. Owing to the working movement of this member, as well as to the conical shape of the cavities 11, and the rotational moveability of the drum in the direction of the arrow 29, the drum is rotated in steps, from any one cavity to the next, until all cavities have been filled, and the amounts of dough are kneaded one after the other in the manner described.

The modification shown in Figs. 4—6 is distinguished from that of Figs. 1 to 3 by the feature that step-wise rotatory movement is effected in another manner by other means.

The drum consists in this modification of three parts, viz. two disks 38 and 38ª and a wheel-like body 43 having a hub 44 supported on the shaft 3 which supports also said two disks. The disk 38ª is connected with the non-rotatable shaft 3 by feather and groove (45) and the disk 38 can be turned on said shaft. On opposite sides of the hub of the disk 38 are two projections 63 attached to the inner face of this disk, and the radially outwardly directed face of each of these projections is inclined in the direction of the arrow 29. Clamping rolls 64 are located in the triangular spaces between said inclined faces and the inner wall 43¹ of the drum 43 on the respective side, and are retained in the said spaces by flat springs 70 screwed to lugs 63, as shown in Fig. 4. If, therefore, the disk 38 is rotated in clock-wise direction, also the drum 43 will be turned owing to the clamping action of the rolls 64, whereas the drum will remain at rest when the disk 38 is rotated counter-clockwise.

The disk 38 is rotated in steps from the vertical shaft 12 by the intermediary of the following members: A bevel-wheel 66 is affixed to the lower end of said shaft and meshes with another bevel-wheel 67 affixed to a shaft 59 connected firmly with an eccentric 60, the rod 61 of which is adjustably linked at its upper end to an arm 62 secured to the disk 38 from which it radially projects. The arm 62 and the rod 61 can be adjusted relatively to each other by means of a slot 69 of said arm and a threaded pivot with a wing-nut, as shown in Figs. 4 and 6, said slot permitting the adjustment as will be clear without further details. The rod 61 is moved practically axially by the eccentric and the arm 62 is thereby rocked so that also the disk 38 is rocked, and when its direction of movement corresponds to the arrow 29, also the drum 43 is rotated in this direction (in steps). The kneading member 10 is actuated during that time

continually in the manner described with respect to Figs. 1 and 2.

Reverting to Fig. 3, there is shown in this figure means whereby the extent of the maximum movement of the slide 8 can be varied or adjusted. This refers to both constructional forms of the device, as shown in Figs. 1 and 2 and in Figs. 4 and 5. There is provided for the purpose in view an adjusting screw 56 in the arm 16 of the bell-crank lever 16/16a, and an abutment member 57 co-operating with the free end of said adjusting screw is provided upon the disk 14. It is, therefore, possible to vary the position of the bell-crank lever upon said disk whereby also the extent of maximum movement of the crank-disk 16 and the tension of the spring 17 are varied, always according to the condition of the dough to be kneaded.

The endless band 22 need not indispensably engage the drum 4 (Figs. 1 and 2) at its rear half (the right-hand half), but can engage it only at the opposite half (the left-hand half in Figs. 1 and 4) if the kneading member is extended adequately upwardly along the circumference of the drum, as shown in Fig. 4, the extended portion of the kneading plate 10 preventing the portions of dough lying in the cavities 11 of the drum from falling out of these cavities prior to arriving at the main place of kneading, viz. at the lowermost portion of the drum.

Figure 4 shows also that the endless band (22, Fig. 1) can be completely omitted and instead thereof a discharge shoot 71 can be provided at the front-side of the machine. There may be provided an endless conveying band at the lower end of this shoot by which the moulded portions of dough are carried off. But even the shoot 71 can be omitted and only an endless conveying band provided directly at the discharge portion of the drum in such a position that the moulded portions of dough fall directly upon said band.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A dough kneading machine in which individual portions of dough are kneaded in basin-like cavities in two working directions lying at right angles with respect to one another characterized thereby that the individual portions of the dough are received in conical cavities of a rotary drum, around which they are distributed, and that a kneading member preferably provided with a rough working surface is arranged opposite the circumferential surface of said drum upon a supporting member combined with driving means of such a kind that said kneading member is reciprocated, in the direction of the axis of the said drum and is rocked on this axis.

2. A dough kneading machine according to Claim 1, characterized by a crank-drive for the kneading motion the crank-arm of which can be so varied in dependency on, and controlled by, the resistance of the portion of dough kneaded at the time being that the extent of movement of the kneading member is increased when said resistance decreases, and vice versa.

3. A dough kneading machine according to Claim 2, characterized thereby that the crank-arm is formed by a double-armed lever supported on a crank-disk, and that one arm of said lever can be adjusted with respect to a stationary member provided on said disk, and is coupled with the support of the kneading member; whereas the other arm is subjected to the action of a spring, or springs, controlling automatically the adjustment of the one arm relatively to the crank-shaft while the machine is operating.

4. A dough kneading machine according to the Claims 1—3, characterized thereby that the drum is rotated in one direction only and prevented from rotation in the other direction by a brake band provided with an elastic connection at one end.

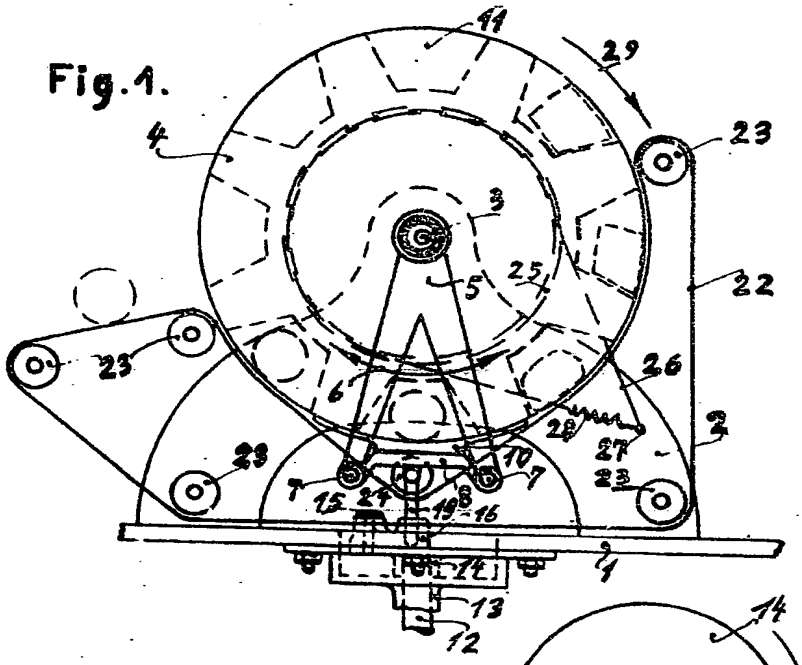
5. A dough kneading machine according to Claim 2 or 3, characterized thereby that the drum is connected with rods actuated from the crank shaft by means of an eccentric and connected in turn with an intermediate member located rotatably at the drum and actuating said drum by means of a coupling driving only in one direction of rotation.

6. A dough kneading machine according to Claim 1, 2, 3, 4 or 5, characterized thereby that the kneading plate is extended upwardly about the circumferential wall of the drum in such a measure that the individual portions of dough lying in the moulding cavities of the drum are prevented from falling out of said cavities.

Dated this 15th day of July, 1927.

S. SOKAL,
1, Great James Street, Bedford Row,
London, W.C.,
Chartered Patent Agent.

Fig. 1.



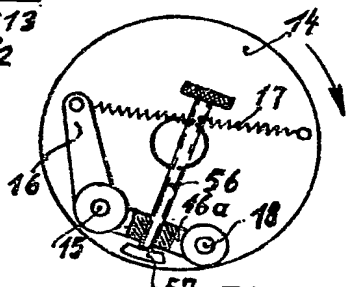


Fig. 3.

Fig. 2.

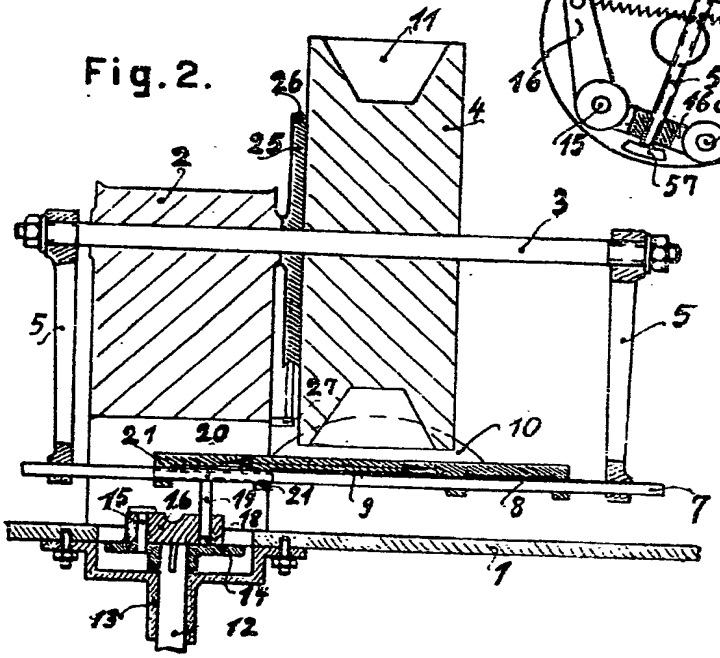


Fig.

71

64
63
3
38
62

Fig. 4.

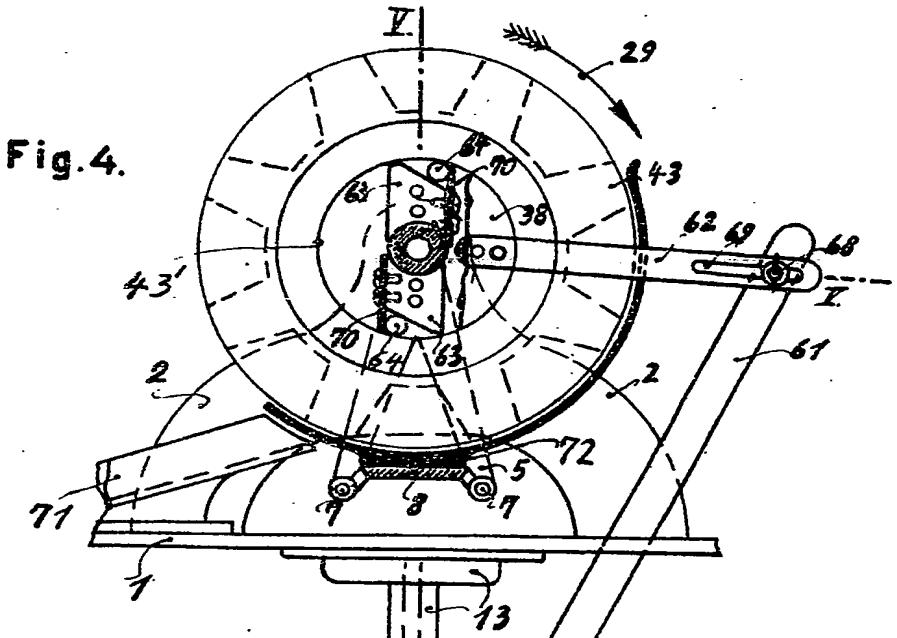
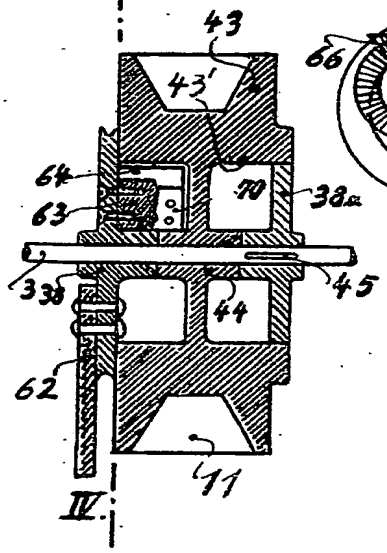


Fig. 5.



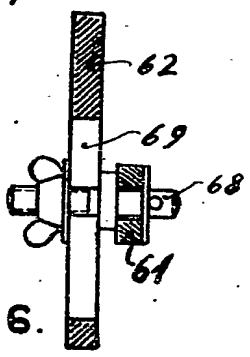


Fig. 6.

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Fig. 1.

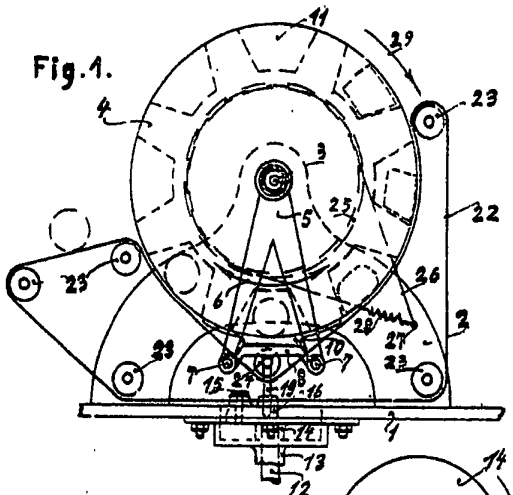


Fig. 2.

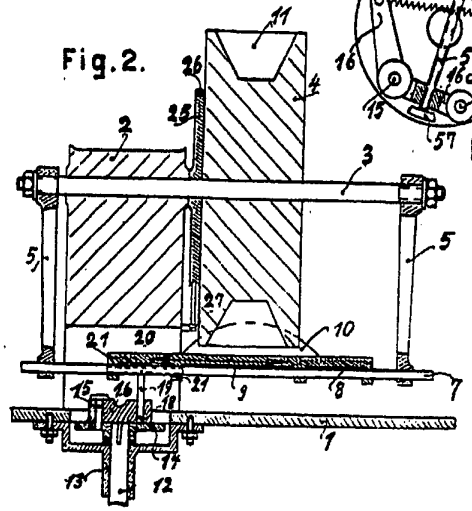


Fig. 3.

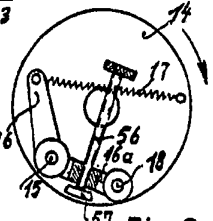


Fig. 4.

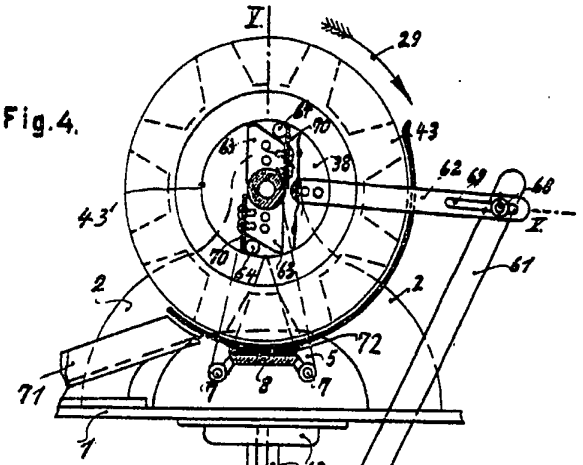


Fig. 5.

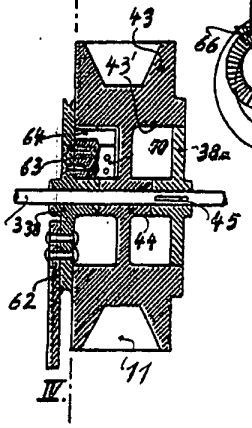
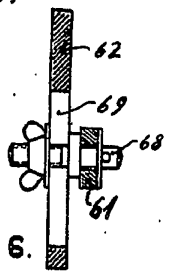


Fig. 6.



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